

WHAT IS CLAIMED IS:

- 1        1. A system for effectuating at least one protocol  
2        layer of a protocol stack operable to implement a high  
3        speed communication link at a network node, comprising:  
4                an input event structure including at least a  
5                service access point (SAP) and a connection identifier  
6                (CID) associated with a protocol layer service involving  
7                a select service user layer and service provider layer  
8                combination for a particular connection link;  
9                a context switch and controller block operable  
10          to retrieve latest state-specific context information  
11          from a context storage area based on said SAP and CID;  
12          and  
13                a generic state logic program structure  
14                operable to process at least a portion of said input  
15                event structure based on said latest state-specific  
16                context information to generate next-state context  
17                information and at least an output event vector including  
18                at least one SAP and at least one CID associated with a  
19                select destination point to which said next-state context  
20                information is to be routed, wherein said next-state context  
21                information is operable to be stored in said  
22                context storage area based on a storage SAP and CID  
23                provided in said input event vector.

1           2. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 1, further comprising a state input queue  
5 structure and a state output queue structure operably  
6 disposed between said generic state logic program  
7 structure and said context switch and controller block  
8 for facilitating information flow therebetween.

1           3. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 2, further comprising a plurality of state  
5 registers operably disposed between said generic state  
6 logic program structure and said context switch and  
7 controller block.

1           4. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 3, wherein at least one of said generic  
5 state logic program structure and said context switch and  
6 controller block is implemented as a field programmable  
7 gate array.

1           5. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 3, wherein at least one of said generic  
5 state logic program structure and said context switch and  
6 controller block is implemented as a programmable logic  
7 device.

1           6. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 3, wherein at least one of said generic  
5 state logic program structure and said context switch and  
6 controller block is implemented as an application  
7 specific integrated circuit.

1           7. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 3, wherein at least one of said generic  
5 state logic program structure and said context switch and  
6 controller block is implemented as a device selected from  
7 the group consisting of a field programmable gate array,  
8 a programmable logic device, an application specific  
9 integrated circuit, an embedded processor and a general  
10 purpose processor.

1           8. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as a Message Transfer  
6 Part-Level 3 (MTP-3) queue control state machine based on  
7 said state-specific context information in said context  
8 storage area.

1           9. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as a Service Specific  
6 Coordination Function (SSCF) control state machine based  
7 on said state-specific context information in said  
8 context storage area.

1           10. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as an Asynchronous  
6 Transfer Mode (ATM) Adaptation Layer (AAL) control state  
7 machine based on said state-specific context information  
8 in said context storage area.

1           11. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as an ATM queue  
6 control state machine based on said state-specific  
7 context information in said context storage area.

1           12. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as an ATM control  
6 state machine based on said state-specific context  
7 information in said context storage area.

1           13. The system for effectuating at least one  
2 protocol layer of a protocol stack operable to implement  
3 a high speed communication link at a network node as set  
4 forth in claim 7, wherein said generic state logic  
5 program structure is personalizable as a Service Specific  
6 Connection Oriented Protocol (SSCOP) control state  
7 machine based on said state-specific context information  
8 in said context storage area.

1           14. The system for effectuating at least one  
2        protocol layer of a protocol stack operable to implement  
3        a high speed communication link at a network node as set  
4        forth in claim 7, wherein said generic state logic  
5        program structure is personalizable as a Traffic Metering  
6        and Measurement (TMM) control state machine based on said  
7        state-specific context information in said context  
8        storage area.

1           15. The system for effectuating at least one  
2        protocol layer of a protocol stack operable to implement  
3        a high speed communication link at a network node as set  
4        forth in claim 7, wherein said generic state logic  
5        program structure is personalizable as a Timer control  
6        state machine based on said state-specific context  
7        information in said context storage area.

1           16. The system for effectuating at least one  
2        protocol layer of a protocol stack operable to implement  
3        a high speed communication link at a network node as set  
4        forth in claim 7, wherein said generic state logic  
5        program structure is personalizable as a state machine  
6        operating to transfer SSCOP layer data based on said  
7        state-specific context information in said context  
8        storage area.

1           17. The system for effectuating at least one  
2        protocol layer of a protocol stack operable to implement  
3        a high speed communication link at a network node as set  
4        forth in claim 7, wherein said generic state logic  
5        program structure is personalizable as a state machine  
6        operating to transfer SSCF layer data based on said  
7        state-specific context information in said context  
8        storage area.

1           18. The system for effectuating at least one  
2        protocol layer of a protocol stack operable to implement  
3        a high speed communication link at a network node as set  
4        forth in claim 7, wherein said generic state logic  
5        program structure is personalizable as a state machine  
6        operating to transfer AAL layer data based on said state-  
7        specific context information in said context storage  
8        area.

1           19. A system for implementing a high speed link  
2           (HSL) protocol stack having a plurality of protocol  
3           layers at an application node disposed in a network,  
4           comprising:

5           a link data processor for coordinating cell  
6           assembly and disassembly operations with respect to  
7           traffic flowing into and out of said application node;

8           a link control processor coupled to said link  
9           data processor via an inter-device interface, said link  
10           control processor operating to maintain link states for  
11           control portions of at least one of said protocol layers  
12           by utilizing a personalizable generic state processing  
13           architecture;

14           a data transfer controller coupled to said link  
15           control processor via another inter-device interface for  
16           controlling burst transfers of signal units (SUs) between  
17           a host memory provided for said application node and a  
18           local cell memory associated with said link data  
19           processor; and

20           a context memory block disposed between said  
21           link control processor and said data transfer controller  
22           for storing state-specific context information based on  
23           a service access point (SAP) and a connection identifier  
24           (CID) associated with at least one of said protocol stack  
25           layers across at least one active connection maintained  
26           by said application node in said network, said context  
27           information for personalizing said generic state

28 processing architecture to effectuate functionality of a  
29 select protocol stack layer.

1       20. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 19, further comprising an error reporting block  
5 having a serial interface at least for reporting physical  
6 errors including at least one of a memory parity error,  
7 queue overflow error and an inter-device interface error.

1       21. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 19, wherein at least one of said link data  
5 processor, said link control processor and said data  
6 transfer controller is implemented as a device selected  
7 from the group consisting of a field programmable gate  
8 array, a programmable logic device, an application  
9 specific integrated circuit, an embedded processor and a  
10 general purpose processor.

1           22. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 21, wherein said select protocol stack layer  
5 comprises a Message Transfer Part-Level 3 (MTP-3) layer.

1           23. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 21, wherein said select protocol stack layer  
5 comprises a Service Specific Coordination Function (SSCF)  
6 layer.

1           24. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 21, wherein said select protocol stack layer  
5 comprises a Service Specific Connection Oriented Protocol  
6 (SSCOP) layer.

1           25. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 21, wherein said select protocol stack layer  
5 comprises an Asynchronous Transfer Mode (ATM) Adaptation  
6 Layer (AAL).

1           26. The system for implementing an HSL protocol  
2 stack having a plurality of protocol layers at an  
3 application node disposed in a network as set forth in  
4 claim 19, wherein said link data processor and said link  
5 control processor are integrated into a single block.

1           27. A method for effectuating a layer service in a  
2 protocol stack operable to implement a high speed  
3 communication link at a network node, comprising the  
4 steps of:

5           receiving, at a context switching system, an  
6 input event for said layer service from a service user  
7 layer;

8           retrieving, by said context switching system,  
9 state-specific context information from a context memory  
10 based on a service access point (SAP) and a connection  
11 identifier (CID) relating to said input event;

12           processing at least a portion of said input  
13 event by a generic state machine (GSM) logic structure  
14 personalized by said state-specific context information;

15           generating, by said personalized GSM logic  
16 structure, next-state information and at least an output  
17 event vector including SAP/CID information for  
18 identifying at least one service user destination; and

19           storing said next-state information in said  
20 context memory based on said SAP/CID information provided  
21 in said input event.

1           28. The method for effectuating a layer service in  
2        a protocol stack operable to implement a high speed  
3        communication link at a network node as set forth in  
4        claim 27, wherein at least one of said GSM logic  
5        structure and said context switching system is  
6        implemented as a device selected from the group  
7        consisting of a field programmable gate array, a  
8        programmable logic device, an application specific  
9        integrated circuit, an embedded processor and a general  
10      purpose processor.

1           29. The method for effectuating a layer service in  
2        a protocol stack operable to implement a high speed  
3        communication link at a network node as set forth in  
4        claim 28, wherein said GSM logic structure is  
5        personalized as a Message Transfer Part-Level 3 (MTP-3)  
6        queue control state machine based on said state-specific  
7        context information retrieved from said context memory.

1           30. The method for effectuating a layer service in  
2        a protocol stack operable to implement a high speed  
3        communication link at a network node as set forth in  
4        claim 28, wherein said GSM logic structure is  
5        personalized as a Service Specific Coordination Function  
6        (SSCF) control state machine based on said state-specific  
7        context information retrieved from said context memory.

1           31. The method for effectuating a layer service in  
2 a protocol stack operable to implement a high speed  
3 communication link at a network node as set forth in  
4 claim 28, wherein said GSM logic structure is  
5 personalized as a Service Specific Connection Oriented  
6 Protocol (SSCOP) control state machine based on said  
7 state-specific context information retrieved from said  
8 context memory.

1           32. The method for effectuating a layer service in  
2 a protocol stack operable to implement a high speed  
3 communication link at a network node as set forth in  
4 claim 28, wherein said GSM logic structure is  
5 personalized as an Asynchronous Transfer Mode (ATM)  
6 Adaptation Layer (AAL) control state machine based on  
7 said state-specific context information retrieved from  
8 said context memory.

1           33. The method for effectuating a layer service in  
2 a protocol stack operable to implement a high speed  
3 communication link at a network node as set forth in  
4 claim 28, wherein said GSM logic structure is  
5 personalized as an ATM control state machine based on  
6 said state-specific context information retrieved from  
7 said context memory.